

Short-Term Changes in Aerosol Characteristics at the Rural Site Kharagpur (22.3°N, 87.3°E) in India During December 2004

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The physical and chemical characteristics of aerosols at any location depend on the nature of sources, sinks and transport mechanisms. In addition, the prevailing meteorological conditions also modify the behavior and impact of aerosols. During winter season, the unique meteorological conditions prevailing over the Northern plains of India is conducive for the confinement of aerosols and trace gases to lower regions of the atmosphere and formation of fog and thick haze. The Land Campaign conducted under the Geosphere Biosphere Programme of Indian Space Research Organization focused on the study of the temporal and spatial behaviour of these minor constituents during this period. The present study forms part of this campaign and is based on the measurements carried out at the rural site Kharagpur (22.3°N, 87.3°E, 40m above msl) in India. A high volume aerosol sampler, aerosol particle spectrometer and Microtops Sunphotometer were operated at this location to make systematic measurements of aerosol mass loading, number density, size distribution, and optical depth for a period of one month during December 2004. The aerosol samples collected at regular intervals were also analysed to study the chemical composition employing IC, AAS and ICP-AES. The mean mass concentration of aerosols were 5 to 8 times higher compared to those observed at most of the rural and coastal locations over peninsular India. The number density showed well-defined diurnal pattern with sharp minimum around noontime, which is closely linked with boundary layer characteristics. Aerosol number density, mass loading as well as the optical depth showed oscillatory behaviour towards the second half of December 2004. Majority of ions exhibited pronounced day-to-day variability in their mass concentrations depending on prevailing meteorology as well as surface flow patterns. These characteristics are examined in the light of prevailing meteorological conditions like temperature, RH, surface flow patterns and also the air mass back trajectory analysis.